

# **Improving fuel economy in Murmansk: the value of bus fleet upgrades**

International conference “Improving fuel economy and reduction of emissions from road transport in Russia”, Moscow, 17-18 June 2014

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# Outline

- Project overview
- Diesel consumption and emissions by buses in Murmansk
- Case study: fleet upgrades at the bus company “Murmanskavtotrans”
  - Fuel economy and economic effects
  - Market value
  - Social value
- Conclusions

# Reduction of Black Carbon from Diesel Sources in Russian Arctic

## Project Objectives:

- Assess primary sources of black carbon in the Russian Arctic;
- Develop a targeted baseline emission inventory for black carbon from diesel sources in key areas;
- **Implement targeted, on-the-ground demonstration projects for reducing black carbon from diesel;**
- Establish policy recommendations and financing options for reducing black carbon diesel sources.

# Diesel Fuel Use Estimate in Murmansk Region, 2012

Activity	Diesel Use (tons)
On-road transport	<i>212,700</i>
Off-road transport	
Mines	139,000
Agriculture and construction	6,500
Other non-road transport	14,900
Fishing and marine shipping	87,100
Rail	15,700
Trade and services (back up generators?)	7,600
Off-grid generators (large)	<i>1,700</i>

Statistical data from Murmanskstat; items in italics estimated based on bottom up calculations

# Black Carbon Emissions by Buses in Murmansk City, kg per year

Ecological class	BC emissions (kg)
Euro 0	7 725
Euro 1	69
Euro 2	282
Euro 3	182
Euro 4	16
Euro 5	2

Source for inventory: Avtostat, 2012

Calculations are based on simplified NIIAT methodology

# Bus company: Murmanskavtotrans (MAT)

- Largest public transport company in Murmansk Region
- Intercity routes, and recently won tender for routes in Murmansk City
- MAT owns about 200 buses
- Most buses: Inefficient, Euro 0 and Euro 1 ecological classes. Only 19 buses before fleet upgrade were in Euro 3 and Euro 4 classes



# **MAT bus fleet upgrade**

Made decision to lease 52 new buses in 2013

Phase 1, 2013:

- MAT leased 31 new MAZ buses with Mercedes engines, with significantly higher efficiency
- Retired 50 old buses

Phase 2, 2014:

- MAT leased additional 21 new MAZ buses
- The company will retire additional 30 old buses

In addition, Murmansk city bus company retired many buses when MAT won contract for city routes in 2014.

# **New buses began to arrive in December 2013**



# MAT bus fleet upgrade: summary

	New buses	Buses being retired
Make and model	52 MAZ-103 buses	80 buses, mixed makes
Average fuel economy, liters per 100 km	25	40
Emission controls	Euro 5 (exceeding Euro 4 minimum for new buses)	Euro 0
Year of production	2013 and 2014	Between ~1970 and 1985

This does not reflect additional buses owned by Avtokolonna 1118, the company that operated suburban routes until 2014. Most of these Avtokolonna buses are also being retired from use in Murmansk.

# **MAT bus fleet upgrade: results**

## **First phase:**

- The fuel economy is 350,000 liters per year
- Amount of money saved on fuel is \$380,000
- Black carbon emissions reduction is 1250 kg per year

## **Second phase:**

- The fuel economy is 240,000 liters per year
- Amount of money saved on fuel is \$260,000
- Black carbon emissions reduction is 850 kg per year

# Fuel economy and economic effects

- The fuel economy is 585,000 liters of diesel per year
- Amount of money saved on fuel is \$640,000 per year
- Murmanskavtotrans also closed a maintenance facility for old buses
- Still assessing other costs and savings, like financing, AdBlue, costs/savings of fully retiring old buses for city routes (those not owned by MAT).

# Market Value

- Key issue to ensure sustainability has market value: including environmental and efficiency criteria in tender documents for route licenses or bus purchases; concrete way local governments can encourage more efficient, sustainable transport.

Value from company perspective (buyer/operator):

- Lower operating costs = more competitive/profitable
- Increased reliability and comfort of the buses increases customer base, and the sustainability of bus transport. MAT has the lowest level of passenger complaints in Murmansk.
- Better position in future tenders (depending on tender terms)

# Social value

- Less pollution – reduction of health risks:
  - Exposures to fine particles, including black carbon, can cause premature death and harmful effects on the cardiovascular system ( the heart, blood, and blood vessels);
  - The people most at risk include people with heart or lung disease (including asthma), older adults, children, and people of lower socio-economic status
  - Decreases in long-term PM<sub>2.5</sub> exposures have been associated with an estimated increase in average life expectancy.
- Improved environmental quality
- More reliable, sustainable public transportation

# Conclusions

## Lessons for companies

- It is important to have a long-term vision for business development
- Bus upgrades can have positive economic, environmental and social effects

## Lessons for local and central government

- Push companies to upgrade their fleets
- Include requirements on efficiency and Euro class in tender documentation with maximum allowed weight in selection process